National Semiconductor

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MM54C08/MM74C08 Quad 2-Input AND Gate

General Description

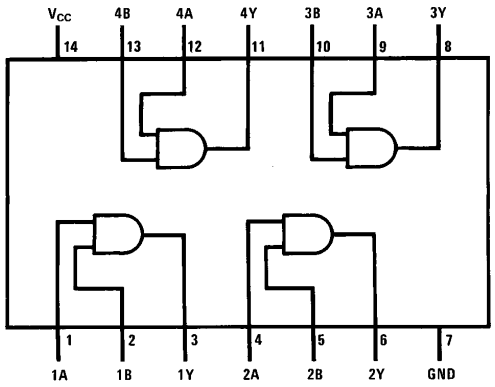
Employing complementary MOS (CMOS) transistors to achieve wide power supply operating range, low power consumption and high noise margin, these gates provide basic functions used in the implementation of digital integrated circuit systems. The N- and P-channel enhancement mode transistors provide a symmetrical circuit with output swing essentially equal to the supply voltage. No DC power other than that caused by leakage current is consumed during static condition. All inputs are protected from damage due to static discharge by diode clamps to V_{CC} and GND.

Features

■ Wide supply voltage range	3.0V to 15V
■ Guaranteed noise margin	1.0V
■ High noise immunity	0.45 V_{CC} (typ.)
■ Low power TTL compatibility	Fan out of 2 driving 74L
■ Low power consumption	10 nW/package (typ.)

Connection Diagram and Truth Table

Dual-In-Line Package



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Top View

Order Number MM54C08 or MM74C08

Inputs		Outputs
A	**B**	**Y**
L	L	L
L	H	L
H	L	L
H	H	H

H = High Level L = Low Level

Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Voltage at Any Pin	−0.3V to V_{CC} + 0.3V
Operating Temperature Range	
MM54C08	−55°C to +125°C
MM74C08	−40°C to +85°C
Storage Temperature Range	−65°C to +150°C
Power Dissipation (P_D)	
Dual-In-Line	700 mW
Small Outline	500 mW
Operating V_{CC} Range	3.0V to 15V
Absolute Maximum V_{CC}	18V
Lead Temperature (Soldering, 10 seconds)	260°C

DC Electrical Characteristics

Min/Max limits apply across the guaranteed temperature range, unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Units
CMOS TO CMOS						
$V_{IN(1)}$	Logical "1" Input Voltage	V_{CC} = 5.0V	3.5			V
		V_{CC} = 10V	8.0			V
$V_{IN(0)}$	Logical "0" Input Voltage	V_{CC} = 5.0V			1.5	V
		V_{CC} = 10V			2.0	V
$V_{OUT(1)}$	Logical "1" Output Voltage	V_{CC} = 5.0V, I_O = −10 μA	4.5			V
		V_{CC} = 10V, I_O = −10 μA	9.0			V
$V_{OUT(0)}$	Logical "0" Output Voltage	V_{CC} = 5.0V, I_O = 10 μA			0.5	V
		V_{CC} = 10V, I_O = 10 μA			1.0	V
$I_{IN(1)}$	Logical "1" Input Current	V_{CC} = 15V, V_{IN} = 15V		0.005	1.0	μA
$I_{IN(0)}$	Logical "0" Input Current	V_{CC} = 15V, V_{IN} = 0V	−1.0	−0.005		μA
I_{CC}	Supply Current	V_{CC} = 15V		0.01	15	μA
CMOS/LPTTL INTERFACE						
$V_{IN(1)}$	Logical "1" Input Voltage	54C, V_{CC} = 4.5V	V_{CC} − 1.5			V
		74C, V_{CC} = 4.75V	V_{CC} − 1.5			V
$V_{IN(0)}$	Logical "0" Input Voltage	54C, V_{CC} = 4.5V			0.8	V
		74C, V_{CC} = 4.75V			0.8	V
$V_{OUT(1)}$	Logical "1" Output Voltage	54C, V_{CC} = 4.5V, I_O = −360 μA	2.4			V
		74C, V_{CC} = 4.75V, I_O = −360 μA	2.4			V
$V_{OUT(0)}$	Logical "0" Output Voltage	54C, V_{CC} = 4.5V, I_O = 360 μA			0.4	V
		74C, V_{CC} = 4.75V, I_O = 360 μA			0.4	V
OUTPUT DRIVE (see 54C/74C Family Characteristics Data Sheet) T_A = 25°C (short circuit current)						
I_{SOURCE}	Output Source Current (P-Channel)	V_{CC} = 5.0V, V_{OUT} = 0V	−1.75	−3.3		mA
I_{SOURCE}	Output Source Current (P-Channel)	V_{CC} = 10V, V_{OUT} = 0V	−8.0	15		mA
I_{SINK}	Output Sink Current (N-Channel)	V_{CC} = 5.0V, V_{OUT} = V_{CC}	1.75	3.6		mA
I_{SINK}	Output Sink Current (N-Channel)	V_{CC} = 10V, V_{OUT} = V_{CC}	8.0	16		mA

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. Except for "Operating Temperature Range" they are not meant to imply that the devices should be operated at these limits. The table of "Electrical Characteristics" provides conditions for actual device operation.

AC Electrical Characteristics*

(MM54C08/MM74C08) $T_A = 25°C$, $C_L = 50$ pF, unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_{pd0}, t_{pd1}	Propagation Delay Time to Logical "1" or "0"	$V_{CC} = 5.0V$		80	140	ns
		$V_{CC} = 10V$		40	70	ns
C_{IN}	Input Capacitance	(Note 2)		5.0		pF
C_{PD}	Power Dissipation Capacitance	(Note 3) Per Gate		14		pF

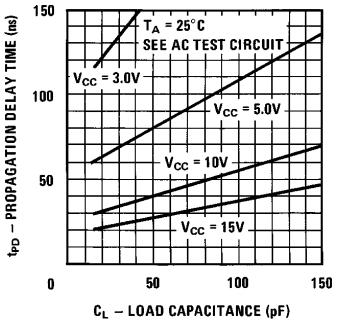
*AC Parameters are guaranteed by DC correlated testing.

Note 2: Capacitance is guaranteed by periodic testing.

Note 3: C_{PD} determines the no load AC power consumption of any CMOS device. For complete explanation see 54C/74C Family Characteristics Application Note—AN-90.

Typical Performance Characteristics

Propagation Delay Time vs Load Capacitance MM54C08/MM74C08



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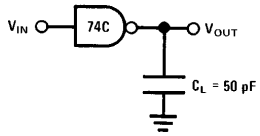
AC Test Circuit



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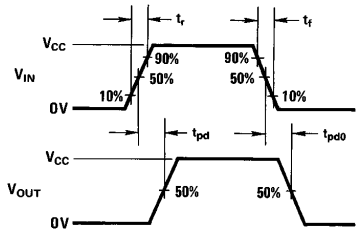
Note: Delays measured with input t_r, $t_f = 20$ ns

Switching Time Waveforms



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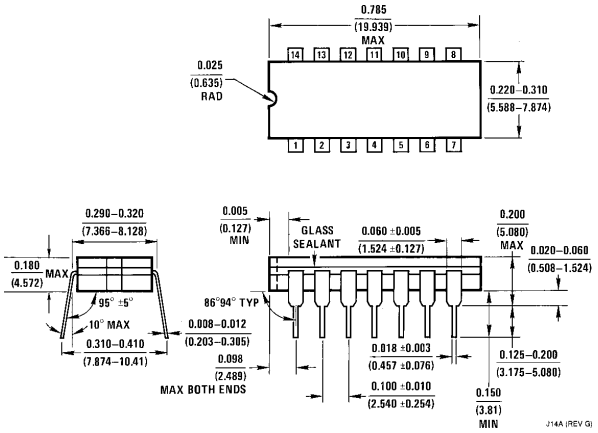
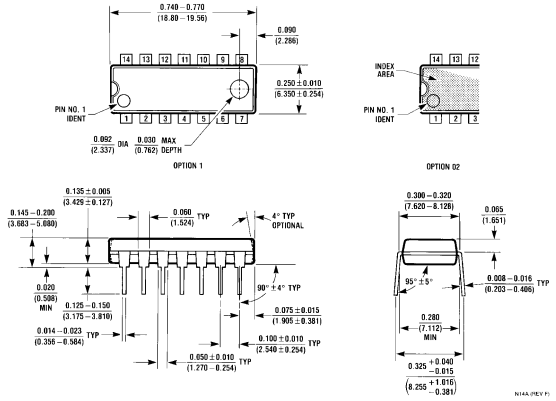
Physical Dimensions inches (millimeters)



Ceramic Dual-In-Line Package (J)
Order Number MM54C08J or MM74C08J
NS Package Number J14A



Molded Dual-In-Line Package (N)
Order Number MM54C08N or MM74C08N
NS Package Number N14A

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